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I. A REVIEW OF THE YEAR'S PROGRESS IN HIGH-SCHOOL SCIENCE

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The salient features of the past year in the high-school science situation are:

1. The appointment of new committees representative of all the sciences to work on the problem of the reorganization of science in the high schools.
2. The appearance of several books on the teaching of science.
3. The appearance of a separate survey of science teaching in a public-school system.
4. The publication of additional tests in science.
5. An unchecked production of science text-books. Surely the law of geometric rate of increase maintains in the field of high-school science texts. It is to be hoped that the struggle for existence will be keen, and further devoutly hoped that there will be a large elimination of the unfit.

There is a Central Committee on Reorganization for the Central Association of Science and Mathematics Teachers consisting of the chairmen of separate committees for each section. This committee, working through the several subordinate committees, is attempting:

A. To get some consensus of opinion of:
1. The general aims of science teaching in the high school and the specific aims for each science subject.
2. The most important concepts and generalizations to be taught in the several high-school science courses.

B. To devise:
1. Ways and means of determining experimentally the best methods of presentation of subject-matter.
2. To devise tests for finding out in how far the courses are accomplishing the desired results.[1]

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[1] "Proceedings of the Eighteenth Meeting of the Central Association of Science and Mathematics Teachers," *School Science and Mathematics*, XIX, No. 3 (March, 1919), p. 197.

The high-school science curriculum was under vigorous discussion at the University of Illinois High School Conference. The science sections in joint session put themselves on record as follows:

"That we pledge our united support to the following program for science instruction in the high school:

"First: Two full year-courses, in what shall be essentially fundamental science. This work to be given in the first two years of the high school, or, where junior high schools exist, the same work may be done in the eighth and ninth grades or spread over the seventh, eighth, and ninth grades. This work, which is intended as the common pabulum of scientific knowledge, should be required of all students in so far as it is administratively possible.

"Second: As many full year-courses in the applied sciences, and in the special sciences, should be given in the later years of the high-school course as there is demand for, and as the size of the faculty and equipment will permit. These latter courses, unless it be in the case of agriculture and home economics for certain groups of students, should be purely elective, and should be so organized and taught that each year-course may answer as the equivalent of a first semester course in the subject in college."

A committee was named to report recommendations regarding the content of this first two years of fundamental science.[1]

There is a committee of the British Association "to consider and report upon the method and substance of science teaching in the secondary schools, with particular reference to the essential place for science in general education." The *School World*[2] gives some of the findings of this committee.

In how far the aims, method, and content of high-school science instruction will be determined by the findings of such committees it is difficult to say. When, however, one goes over the recommendations of past committees like those in the report of the Committee of Ten, the Committee of Fifteen, the American Naturalists Committee,[3] the Committee of the Central Science Association,[4] the National Education Association Committee,[5] and various reports of the subcommittees, it is surprising to see how many of the recommendations have been followed in the later developments of science instruction. One becomes optimistic after such a review of the value of such committee work. Possibly such reports merely give forceful expression to ideas that are unobtrusively working in the mass of the teaching force, but, even so, they focus attention on movements that are under way and so stimulate their progress.

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[1] *University of Illinois Bulletin*, XVI, No. 12, p. 77.

[2] *School World* (London), XX (1918), 28–32.

[3] *Education*, IX, 547–49.

[4] *School Science and Mathematics*, X, 101.

[5] *School Science and Mathematics*, V, No. 1.

Two notable additions were made this year to the science teachers' library of the pedagogy of science. Already we include in this list of books the old but still valuable *Systematic Science Teaching*, by Howe; *The Teaching of Biology*, by Lloyd and Bigelow; *The Teaching Botanist*, by Ganong; *The Teaching of Chemistry and Physics*, by Smith and Hall; *The Teaching of Physics*, by Mann; *Broad Lines in Science Teaching*, by Hodson; and *Science Teaching*, by Twiss. Now come *The Teaching of Science*, by Woodhull, and *The Teaching of Science in the Elementary School*, by Trafton.

The first of these new books is a series of papers and addresses, now gathered in book form by John F. Woodhull of Teachers College, Columbia University (Macmillan, $1.25). It deals largely with instruction in physics and chemistry, yet the principles discussed appeal to all science teachers. Such chapters as "The Educational Value of Natural Science," "Science for Culture," "Learning from Experience," "Science Teaching by Projects," and "The Imitation of the Masters" are indicative of the type of topics discussed.

Gilbert H. Trafton is instructor in science at the State Normal School, Mankato, Minnesota, and has had wide experience in science work in the elementary schools. His book is of interest to the high-school science teacher chiefly because it indicates the kind of science preparation pupils may be expected to bring to the high school in good school systems (Houghton Mifflin Co., $1.50).

In the series of reports of the General Education Board, New York City, on the survey of the Gary Schools there has just appeared the report on science by Otis W. Caldwell of Teachers College, Columbia University. This is noteworthy because it is the first attempt to present a reasonably complete survey of science instruction including both that of the grades and that of the high school in any school system. In the concluding chapter the surveyor commends some instructors seeking "to show the way in which science principles and science knowledge are used in the affairs of modern society." The botany and gardening of the Froebel School are "kept in close contact with the facts and needs of life . . . . . Gary has, however, shown courage and resourcefulness in trying to free science teaching from its remote and abstract character, in trying to bring it into touch with the pupil's experience and to relate it to his other school work. As illustrations of the way in which this is done may be mentioned some projects of the chemistry instruction. In the Emerson School the coal used by the Gary Schools is tested for calorific value and the bills are paid on the basis of these tests to the entire satisfaction of the companies furnishing the coal and the school authorities. Commercial jellies were obtained and tested to determine the presence of glucose, cane sugar, and the nature of the coloring matters. Pupils went with the city food inspector and the Board of Health officers and later measured milk samples, spread plates, and counted bacteria colonies."

The author's final critical evaluation of the situation is as follows:

"Beyond a general and sound predilection for the concrete as embodied in the environment and experience of the pupil, it is impossible to discern at Gary satisfactory principles of organization or progression in science teaching. Unquestionably, the children are interested in their science work and derive pleasure from it, and to this end the work is of value. But science fulfils its educational mission, not simply by arousing interest in a disconnected series of phenomena or giving pleasure through a disconnected series of experiences, but by cultivating capacity to deal intelligently and vigorously with significant problems. This ought indeed to be both an interesting and a pleasurable task; but unless it involves order, persistence, and hard work, its educative effect is probably of minor importance. Unless so presented, science is likely to be a transient diversion rather than a profoundly formative and truly disciplinary influence in the pupil's development."

The above survey of the science at the Gary schools is also interesting because nearly half oft he pamphlet, pages 64–120, is devoted to the description and discussion of a number of tests given largely to the elementary-school pupils but in part also to the high-school pupils. There are nine of these tests, and they are used in five eighth-grade classes, one seventh-grade class, and in the twelfth-grade high-school classes in two of the schools. These tests deal, first, with observation and discrimination based upon subjects placed before the pupils; secondly, with the pupils' ability to recall experiences in science study; and thirdly, with the ability to see and interpret experiments or demonstrations made before the pupils. There are detailed tabulations of the results showing the accomplishment of each pupil and also summaries of the tests. In each test a certain number of points are tabulated which pupils should note in order to make a perfect score. Thus in Test 1, which is a comparison of an oak and an elm leaf, there are ten items to be noted. The lowest score is 1, the highest 9, and the mean for elementary-school pupils is 3.7. The mean for high-school pupils on this test is 5.

A suggestive range of information tests in science is reported in *School Science and Mathematics*, XIX, No. 3 (March, 1919), 228–33. A new test has also appeared during the year in chemistry.[1]

It is impossible to note in a small space the many new texts that have appeared during the year. No radical departure from the commonly used texts in physics and chemistry has come to hand, but there are some in biology and in general science that are worth noting. Transeau's *Science of Plant Life, High School Botany* (World Book Co., $1.48) is noteworthy because the relation of the plant to its environment is stressed and because the treatment is simple. A large amount of economic material is incorporated, and the word "incorporated" is used advisedly, for it is so fused with the general treatment that it is a natural part of the book, not something tacked on as an afterthought.

The same company has put out a simple foundation book on agriculture called *Farm Science*, by W. J. Spillman ($1.28). Mr. Spillman is chief of the Office of Farm Management of the United States Department of Agriculture. He has managed to cover the essential topics, and yet he keeps the book within the comprehension of the high-school pupil. The book is divided into four parts, treating respectively the soil, the plant, the animal, the farm.

The Elements of Economic Zoology, by Albert M. Reese (P. Blakiston's Son & Co.) seems merely an old-fashioned zoology with considerable economic material added. The treatment is taxonomic, the successive groups being taken up from the protozoa through the mammals. Little space is devoted to internal structure; much is given to external morphology and natural history. A large amount of valuable information is included in the book—valuable from the point of view of man's use of animals and their products. It would seem possible to devise an organization dependent upon economic relations instead of treating the successive groups and introducing under each the economic material.

William A. Locy's *The Main Currents of Zoology* (Henry Holt & Co.) is an attempt to trace the development of the important concepts and generalizations in zoology. The book is not intended as a high-school text in zoology, but will be a welcome addition to the high-school library, giving that personal touch with the men connected with the great ideas that is so stimulating a factor in high-school instruction.

The Elements of Animal Biology by S. J. Holmes (P. Blakiston's Son & Co., $1.35) devotes some ten chapters to the insects and the successive chapters to the other great groups of animals, including six chapters of Part I on the vertebrates. Part II, pp. 232-330, deals with animal physiology, while Part III is in a large measure devoted to evolution and heredity. The book is an admirable treatment from the point of view of science, but shows little tendency to the industrialization or socialization of biology that marks such books as Hodge's *Civic Biology* or Hunter's *Civic Biology*. It marks no advance, but is rather a reversion to an old type of text.

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[1] Hanor A. Webb, "A Preliminary Test in Chemistry," *Journal of Educational Psychology*, X, No. 1, pp. 36–43.

Three texts in general science are to be added to the output that seemed quite adequate already. Brownell's *Textbook in General Science* (P. Blakiston's Son & Co., $1.00), *Introduction to the Study of Science* by Smith and Jewett (Macmillan, $1.40), and *The Science of Everyday Life*, by Van Buskirk and Smith (Houghton Mifflin Co., $1.40). The title of the last book seems to describe adequately the content of all of them. All are quite voluminous, running from nearly four hundred to over six hundred pages. All contain much exceedingly interesting material, and if it be the purpose of first-year science to acquaint the pupil with his environment, certainly it would be hard to find a corner of said environment left untouched by such texts. *The Science of Everyday Life* is divided into parts, units, projects, problems, and topics. To label "Air and Fire" a project does violence to the term. The problems and individual projects given seem admirable. The units are "Air and How We Use It," "Water and How We Use It," "Foods and How We Use Them," "Protection—Homes and Clothing," "The Work of the World."

What to teach in general science is apparently being determined by the trial-and-error method. On this basis we may welcome these new trials, only hoping that the real educative values of science may not be lost in a maze of interesting reading.

II. BOOK NOTES AND REVIEWS

A new book on vocational civics.[1]—Teachers who are interested or engaged in the work of vocational guidance in the eighth or ninth grade, whether as a separate subject or as a phase of civic training, are painfully aware of the dearth of suitable material in this vital field. All such will give a cordial welcome to this admirable little book.

After an introductory discussion of the importance of a right choice of one's life-work, there are chapters on the following industries and occupations: government service; earth occupations—agriculture, forestry, mining, and

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[1] Frederick Mayor Giles and Imogene Kean Giles, *Vocational Civics*. New York: Macmillan, 1919. Pp. viii+252. $1.30.